



多极化前向散射RCS分析及其对目标分类识别的影响

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The Analysis of Multi-polarization Forward Scattering RCS and the Effect on Target Classification and Identification

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摘要 在前向散射情况下, 基于阴影逆合成孔径雷达(SISAR)成像原理可以获得运动目标的轮廓像, 从而对运动目标进行分类与识别。为了研究多极化对前向散射雷达运动目标识别的影响, 该文根据前向散射阴影逆合成孔径原理, 建立了目标前向散射雷达截面积(RCS)与目标轮廓像谱信息之间的联系, 首次将多极化引入到前向散射目标的分类识别中; 并借助电磁仿真软件CST, 仿真得到了多极化条件下目标的前向散射RCS曲线。通过分析仿真结果发现同一个目标在不同极化情况下具有不同的前向散射RCS旁瓣曲线, 此种差异对应于目标轮廓像的差异; 联合多极化产生的前向散射RCS旁瓣差异可以获得更多关于目标轮廓的特征信息。仿真结果验证了多极化能够提高前向散射目标分类识别的能力。

关键词: 阴影逆合成孔径雷达(SISAR) 目标识别 多极化 前向散射雷达截面积

Abstract: The Forward Scattering Radar (FSR) can obtain moving target profile image with the technology of Shadow Inverse Synthetic Aperture Radar (SISAR), which can be used as target classification and identification. In order to research the effect of multi-polarization on moving target identification in FSR, the following work is carried out. Firstly, based on the theory of SISAR, the connection between forward scattering Radar Cross Section (RCS) and spectral information of profile image is established. Secondly, multi-polarization is firstly introduced to FSR target identification, and the target forward scattering RCS under multi-polarization conditions is obtained using the software of CST. Finally, by analyzing the simulation results, it is found that the same target has a different forward scattering RCS side-lobe under different polarization conditions. This difference corresponds to the difference of target profile image. The more information of target profile can be obtained using joint multi-polarization. The simulation results verify that multi-polarization can improve the ability of target classification and identification in FSR.

Keywords: Shadow Inverse Synthetic Aperture Radar (SISAR) Target identification Multi-polarization Forward scattering radar cross section

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